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Volume 42

AUGUST 15, 1961

No. 10

PHILIPPINE ZOOLOGICAL EXPEDITION

1946-1947

NEW AND INTERESTING ODONATA FROM THE PHILIPPINES

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The present account deals with the more important species of Odonata brought home by Messrs. Harry Hoogstraal and Floyd G. Werner, whose efforts as members of the Philippine Zoological Expedition have been rewarded by excellent results. In addition to a fair number of widely distributed species, which are purposely omitted here, this collection includes a number of interesting novelties, most of which are dealt with in the present paper.

I have already indicated¹ the main characters of the Malaysian Odonata in opposition to those of the Papuan Region. This was possible because these regions have been fairly intensively investigated. Though a considerable amount of material is available for study in various museums, the acquisitions from the intermediate "Wallacean" islands of the Philippines, the Celebes and the northern Moluccas have not so far been worked out in any detail, so that no attempt can yet be made to give an idea of the Philippine Odonata in relation to those of the surrounding island groups, including Formosa. In point of fact only a small percentage of the scarcer and more elusive elements in the autochthonous fauna of this great archipelago has been adequately studied or recorded, and numerous new forms await discovery.

¹ Handlist of Malaysian Odonata; a catalogue of the dragonflies of the Malay Peninsula, Sumatra, Java and Borneo, including the adjacent small islands. *Treubia* (Bogor), 22, suppl., xiii + 202 pp., 1954.

Library of Congress Catalog Card Number: 61-16634

The only fairly recent publication dealing with the Odonata of the Philippine Islands as a whole, is the paper written by James G. Needham and May K. Gyger (The Odonata of the Philippines, Philippine Jour. Sci., 63, 1937; 70, 1939; and 74, 1941). This is a useful and well-illustrated work containing the diagnoses of many new species and a wealth of information, especially on the immature stages. It is, however, neither a monograph nor even a revision of the regional fauna, as most of the generic and specific descriptions are too brief to enable the recognition of closely allied forms, and unfortunately all species described by the older authors, though mentioned in the text, were left unstudied.

As stated above, only the expedition's new species and some of the already known forms whose descriptions require amplification are commented upon in this paper. The definitions of one *Aciagrion* and one *Gynacantha*, both from Palawan, and also of one *Anax* from Mindanao (all of them probably new to science) had to be postponed until more material came to hand; but I have included notes on a few specimens from other sources as well as redescriptions of some old types requiring elucidation.

Interesting details about the Philippine Zoological Expedition 1946-1947, with maps and photographs, are to be found in H. Hoogstraal's account (Fieldiana, Zool., 33: 1-86, 7 pls., 1951).

The following is a list of the species treated in this paper:

- Rhinocypha humeralis* Selys; Palawan and Calamianes Islands; notes (p. 121).
Rhinocypha turconii Selys; Mindanao and ?Cebu; redefined (p. 122).
Rhinocypha dorsosanguinea, new sp. (= *turconii* auct., nec de Selys); Basilan and ?Mindanao; redefined (p. 124).
Rhinocypha sanguinolenta, new sp.; Mindanao (p. 125).
Euphaea amphicyana Ris; Mindanao; allotype described (p. 128).
Drepanosticta halterata (Brauer); Luzon; holotype redefined and figured (p. 129).
Drepanosticta philippa, new sp.; Luzon (p. 132).
Drepanosticta lestoides (Brauer); Mindanao; type and homotype redefined and figured (p. 133).
Drepanosticta annulata (Selys); Luzon; status discussed; lectotype selected (p. 135).
Prodasinieura palawana Lieftinck; Palawan and Busuanga Island (p. 136).
Coeliccia werneri, new sp.; Palawan (p. 137).
Coeliccia dinoceras Laidlaw; Mindanao; redefined and figured (p. 138).
Coeliccia exoleta, new sp.; Mindanao (p. 140).
Risioenemis appendiculata (Brauer); Mindanao (p. 142).
Risioenemis atripes (Needham and Gyger); Mindanao (p. 142).
Risioenemis atropurpurea (Brauer); Luzon (p. 142).
Risioenemis ignea (Brauer); Luzon (p. 143).
Heliogomphus olivaceus, new sp.; Busuanga Island (Calamianes Islands) (p. 143).
Gynacantha alcatheae, new sp.; Mindanao (p. 145).

Gynacantha penelope Ris and *G. pasiphae* Lieftinck; Celebes and Halmahera; comparative notes and figures (pp. 146, 147).

Heteronaias heterodoxa (Selys); Luzon and Mindoro; notes (p. 148).

Rhyothemis phyllis subphyllis Selys; Mindanao; notes (p. 148).

I wish to express my thanks to Messrs. Henry Dybas and Rupert L. Wenzel, of Chicago Natural History Museum, for the opportunity to study this interesting collection and for permission to retain some duplicate specimens for the Leiden Museum. As indicated, the types of the new species are in Chicago Natural History Museum.

Suborder **Zygoptera**

Family **Chlorocyphidae**

Genus **Rhinocypha** Rambur

Needham and Gyger (1939) listed three species of this genus for the Philippine Islands, viz., *R. colorata* Selys, *R. semitincta* Selys, and *R. turconii* Selys, but this was an error, since *semitincta* does not occur in the islands. The clear-winged and much larger *Cyrano unicolor* (Hagen in de Selys) was the only other member of the family known to inhabit the Philippines.

Up to the present time *R. turconii* was considered to have no close relatives in southeast Asia and to stand apart from other species of the genus in a group of its own. Two other Philippine species can now be added to this group; the three are doubtless closely related, though differing markedly in body-coloring.

Rhinocypha humeralis Selys

Rhinocypha humeralis Selys, 1873, Bull. Acad. Belg., (2), 35: 488 (male, Labuan Island, northwest Borneo); Lieftinck, 1954, Handlist, Treubia, 22, suppl., p. 11 (full references).

Rhinocypha eximia Selys, 1873, Bull. Acad. Belg., (2), 35: 488 (male, Borneo).

This species seems to be confined to the northern and eastern parts of Borneo and the adjacent northern chain of islands: Banggi (Banguay), Balabac, Palawan and Busuanga (Calamianes). The last two localities are new records. I have examined good series of both sexes from the smaller islands (no female yet from Busuanga) as well as from several parts of Borneo. There is definite proof that the extent of the opaque wing color may vary in specimens from one locality.

In all males from the islands of Banggi, Balabac, and Palawan, this color in the fore wing occupies a maximum portion of the sur-

face, extending from the tip inward and stopping short at the sixth or seventh postnodal cross-vein. They agree in this respect with the type from Labuan. In the two Busuanga males this terminal coloring is much more restricted, commencing 13-14 cells beyond the nodus, thus conforming to the condition found in the type of *eximia*. However, in our extensive series from eastern and southern Borneo the extent of the dark color varies considerably; the great majority are intermediate between the two extremes just mentioned. The blue body markings are practically identical in all specimens examined.

I have also studied a cotype male of *R. hageni* Krüger, from Jolo (Sulu Islands), which has a color-pattern almost identical with that of *humeralis*, but it can not be linked with that species as it has much broader wings and the opaque coloring extends as far basad as the nodus.

Material examined.—The types of *R. humeralis* and *eximia*, and many other specimens from Borneo, Balabac and Palawan. Two males, Balabac Island, Batabao, May 15, 1947, "flight over stream in dense forest," H. Hoogstraal. Two males, Busuanga Island (Calamianes), Palawan Province, Dimaniang, near sea level, March, 1947, H. Hoogstraal.

Distribution.—Borneo (not west), and the islands of Banggi, Balabac, Palawan, and Busuanga.

Rhinocypha turconii Selys

Rhinocypha turconii Selys, 1891, Anal. Soc. Espan. Hist. Nat., 20: 215-216 (male, "Panay pay, Ile de Zébu").

A beautiful species, closely allied to *R. dorsosanguinea*, new sp., described below, but a little larger and differing in details of coloration. The following descriptions are based on the couple from Mindanao.

Male.—Labium black with the exception of the postmentum and the deeply divided lobes of the prementum (except at extreme apices), which are bright cream. Head otherwise glossy black anteriorly and beneath, the dorsal surface mat black marked with a pair of yellow points one on either side of the lateral ocelli and equal in size to the latter, and a similar though slightly larger pair posteriorly on the epicranial lobes.

Prothorax mat black; a transverse band on the anterior lobe, a large sub-circular dot on the pleurae posteriorly, and a mid-dorsal point just in front of the hinder border of the posterior lobe, clear chrome.

Synthorax bronze-black, marked similarly to *dorsosanguinea*, but incomplete antehumeral and posthumeral yellow stripes linear, the former extending upward only two-fifths of the length of the mesepisternum, the latter three-fifths of the

length of the humeral suture; metepisternal yellow marks reduced to comma-shaped dots, the lowermost vestigial and only one-third the size of the one bordering the upper margin; a broad, oblique, blue-green metapleural band shaped similarly to that of *dorsosanguinea* but a little narrower, a small area surrounding the spiracle black; pale spots on the ventral surface of the thorax considerably smaller than in *dorsosanguinea*, the median (metepimeral) spot cordiform and largest.

Inner surface of all trochanters, the basal one-seventh of the anterior femur, and slightly more than the basal half of the two posterior femora cream; anterior tibiae wholly black, the distal five-sixths of the flattened and slightly expanded inner surface of the two posterior tibiae cream; tarsi black.

Wings shaped and colored similarly to those of *dorsosanguinea* but apex of hind wing slightly less broadly rounded than in that species; opaque area of hind wing commencing at the eighth postnodal of the first series; cross-veins in quadrangle variable, 1-2 in both fore and hind wings. Pterostigma black, that of fore wing scarcely, of hind wing distinctly expanded in the middle, surmounting $5\frac{1}{2}$ -6 cells. Two rows of cells between *C* and *R*₁ distal to pterostigma.

Abdomen deep black, marked with blood red and sky blue, as follows: Segment 1 with one large subcircular lateral spot of blue; segment 2 with two similar and equally large spots of the same color placed one after the other, both irregular in shape but the anterior spot slightly more elongate than the posterior one, which is placed more transversely; latero-ventral surface of tergites 3-8 marked longitudinally with a pair of conspicuous blue spots in the form of thick exclamation marks occupying most of the surface but slightly reduced in size from segment 6 backwards, the periods of these marks vestigial on segment 7 and wholly absent on 8. Dorsal surface of segments 1-2 black, save for a pair of minute red spots in the middle of 2; segments 3-8 for the greater part red above, only a line at extreme base and the median carinae finely black, these marks cut off posteriorly and leaving approximately the distal one-seventh of the surface black. Segments 8-10, anal appendages and the sternites of all segments black. Appendages shaped similarly to those of *dorsosanguinea*, the inferior pair about half as long as the superiors.

Female.—Resembles the male in many respects, but differs as follows: Head more extensively marked with bright chrome: basal three-fourths of mandible bases, a twice smaller transverse streak on the genae, a roundish dot between the eye margin and the clypeus, the lateral surface of the frontal parts of the anteclypeus, a triangular dorsal spot at the base of the postclypeus, a narrow triangle bordering the eye-margin on the epicranium behind the level of the antennae, a pair of circular spots on top of the frons, and the whole anterior surface of the first antennal segment; vertex and epicranial lobes marked as in the male, but the four spots all slightly larger.

Pro- and synthorax marked as in the male, but all stripes and spots a little broader or larger, and all bright chrome, including the metapleural band. An additional yellow line bordering the upper portion of the median carina and a tiny oval antehumeral spot near the upper margin of the mesepisternum. Ventral surface as in the male. Legs black, trochanters and femora as in the male but color chrome instead of light yellow; tibiae and tarsi black.

Wings long, fore and hind wing nearly identical in shape, the apex of the latter not expanded or broadly rounded; membrane hyaline, hind wing with a broad band of semiopaque brown color extending from the third to fourth postnodal cell of the

first series proximal to the pterostigma to somewhat beyond that cell, only the extreme tips uncolored and milky white. Only one row of cells between *C* and *R*₁ distal to the pterostigma. Pterostigma longer than in the male, surmounting 6-7 cells; color in fore wing dark brown, in hind wing the proximal two-thirds brown, the distal third clear yellow.

Abdomen robust, color black, all markings deep chrome; dorsal red bands replaced by a narrow mid-dorsal stripe extending from the base to the apex of segments 1-7, the remaining segments unmarked; sides of segments 1-7 colored similarly to the male but the exclamation marks narrower and parallel-sided, those on segments 6 and 7 only slightly smaller than the preceding; segments 8-10 wholly black including the genital valves and appendages, but the apex of the inner valves yellow. Appendages straight and needle-like, three times longer than segment 10, with acutely pointed tips.

Measurements.—Male, abd. +app. 19.5 mm., hind wing 25.0 mm., pterostigma of fore wing 2.2 mm.; female, 17.7, 26.0, 2.8 mm.

Material examined.—A male and female (both adult), east slope of Mount McKinley, 3,000 feet, Davao Province, Mindanao, collected September 22, 1946, by F. G. Werner. In the collection of Chicago Natural History Museum.

The collection also contains a female of the common and widespread *R. colorata* Selys, taken on the same day and in the same locality with *turconii*, the majority of the former species having been obtained in the plains.

Our male from Mindanao agrees in every respect with the description of the type from Cebu (or Panay?), as far as it goes. The legs of the type are missing; it measures 18 mm. for the abdomen, 23 mm. for the hind wing (*sec. de Selys*). As this species was confused with the next a full description was considered necessary to permit its recognition.

Distribution.—?Cebu; Mindanao.

Rhinocypha dorsosanguinea, new species

Rhinocypha turconii Laidlaw, 1936, Jour. Fed. Malay States Mus., 18: 61-62, pl. I, fig. 2 (male, wings, Basilan Island), *nec de Selys*.

?*Rhinocypha turconii* Needham and Gyger, 1939, Philippine Jour. Sci., 70: 253-254, pl. 12, figs. 147-148 (male, app.; male, Mindanao, male and female, Luzon), *nec de Selys*.

Immediately distinguished from *turconii* by the absence of blue markings on the sides of abdominal segments 3-8, only segments 1 and 2 carrying blue spots smaller in size than those seen in that species. On the pro- and synthorax, the reverse condition prevails, the yellow marks in *dorsosanguinea* being more extensive than they are in *turconii*.

I have before me two males, both from Basilan Island; one of them has been studied and discussed by Laidlaw. These have passed as *turconii* but are not that species, differing from it in a number of characters set forth below. Needham and Gyger (1939), overlooking Laidlaw's account of the supposed *turconii*, quoted de Selys' description but gave no description of the male, so that the identity of the insect reported by these authors must remain doubtful. The description of the female is detailed enough, but it is not stated whether this came from Luzon or Mindanao.

To Laidlaw's description of a Basilan male the following corrections and emendations should be made:

Anterior lobe of prothorax marked with a broad transverse band of yellow and a longitudinal stripe of the same color that runs over the middle and posterior half of the pronotum; a circular spot of yellow also on the ventral part of the mesostigmal plate and a triangular dot of the same size and color filling out the postero-ventral edge of the mesinfraepisternum. Antehumeral mesepisternal stripe greenish yellow, not blue; curved mesepimeral stripe extending along the upper three-fourths of the humeral suture, greenish yellow; metepisternum with two antero-dorsal chrome yellow spots; one elongate streak followed by a twice smaller oval spot along the dorsal crest above it. Ventral surface black, marked with three large chrome yellow twin-spots, one immediately behind the posterior coxae, one on the middle of the metepimerum and one on the metasternal plate behind it.

Legs black, the inner surface of all femora chrome, this color occupying the basal one-third of the anterior pair and the basal half of the posterior two pairs; distal six-sevenths of the flattened and slightly expanded inner surfaces of the posterior two pairs of tibiae also yellow, but the anterior tibiae wholly black.

The rectangular blood-red marks on the dorsal surface of abdominal segments 3-8 are of large size, but all of them are squarely cut off posteriorly, leaving broad black apical rings.

Measurements.—Abd. +app. 16.0-17.0 (not 19) mm., hind wing 20.5-21.5 (not 22) mm., pterostigma of fore wing 2.3 mm.

Holotype.—A male (previously named *R. turconii* Selys), from Basilan Island, Maloong, collected September 25, 1935, by K. Kuwasima. In the Leiden Museum.

Paratypes.—Two males, Basilan Island, without date, collected by Baker, both erroneously identified by Laidlaw and Lieftinck as *R. turconii* Selys. One in the University of Michigan, Museum of Zoology, the other (no. 2457) in the Leiden Museum.

Distribution.—Basilan; ?Mindanao.

***Rhinocypha sanguinolenta*, new species.** Figure 44, A.

Male.—Labium black, only the base of the prementum narrowly yellowish. Head glossy black anteriorly and beneath, the dorsal surface mat black, marked

with a pair of minute orange spots one on either side of the lateral ocelli and equal in size to the latter, and a similar though slightly larger pair posteriorly on the epicranial lobes.

Prothorax mat black; a transverse patch on the anterior lobe, a large subcircular dot on the pleurae posteriorly, and (occasionally) a mid-dorsal point just in front of the hind border of the posterior lobe, orange.

Synthorax mat black, almost lustreless; markings orange-chrome, the pattern similar to that of the previously described species but most stripes and spots a little narrower: a circular spot on the ventral part of the mesostigmal plate and a triangular dot of the same size filling out the postero-ventral edge of the mesinfraepisternum; a longitudinal streak at the median crest of the ante-alar triangles; a pair of narrow ante humeral lines widest basally and tapered upwards extending from one-fourth to about two-fifths the length of the mesepisternum; a curved, parallel-sided and slightly wider posthumeral line along the upper two-thirds of the humeral suture; two short subequal antero-dorsal streaks followed by a marginal point on the upper part of the metepisternum; a broad oblique orange metapleural band, similar to those of *turconii* and *dorsosanguinea* but slightly narrower and more irregular in shape, the spiracle finely bordered with black; ventral surface deep black marked with three conspicuous orange spots exactly as in *dorsosanguinea*.

Legs black; inner surfaces of all trochanters, extreme base of anterior and basal half of posterior two pairs of femora, orange yellow; inner surfaces of the basal half of the anterior tibiae and distal three-fourths of the flattened and slightly expanded posterior two pairs of tibiae pure white; tarsi black.

Wings shaped and colored similarly to those of *dorsosanguinea*, but opaque area of hind wing occupying a greater surface, extending basad to the fourth to eighth postnodal of first series. The minimum extent of the opaque coloring is shown in figure 44, A, for one of the paratypes. Cross-veins in quadrangle very variable, 1-2 in fore wing, 2-4 in hind wing. Pterostigma black, shaped as in *dorsosanguinea*, surmounting 5-7 cells; usually two rows of cells between *C* and *R*₁ distal to pterostigma, but several cells are undivided in both fore and hind wing.

Abdomen shaped as in the allied species; coloration of segments 1-8 almost wholly scarlet, only the lateral mark of segment 1 orange-chrome; segments 9-10 and anal appendages black. Also black are: segment 1 with the exception of a large lateral patch of irregular shape; at base of segment 2 a transverse stripe that gives off a finely tapered longitudinal projection about half-way down, then curves backward along the ventral margin so as to fill out the latero-basal edges of the tergite; a fine line along most of the ventral margin of the tergites; a median stripe at the sternites; and the intersegmental membranes of all segments. Alongside segment 7 the red ground-color is divided longitudinally into two by a black stripe, and on segment 8 the black lateral and ventral stripes are broadened so much that a lateral band of red color occupies only the basal two-thirds of the segment.

Measurements.—Abd. + app. 20.0-21.5 mm., hind wing 26.0-27.4 mm., pterostigma of fore wing 2.5 mm.

Female unknown.

Holotype.—An adult male, from the east slope of Mount McKinley, Davao Province, Mindanao, altitude 2,500 feet, "stream," col-

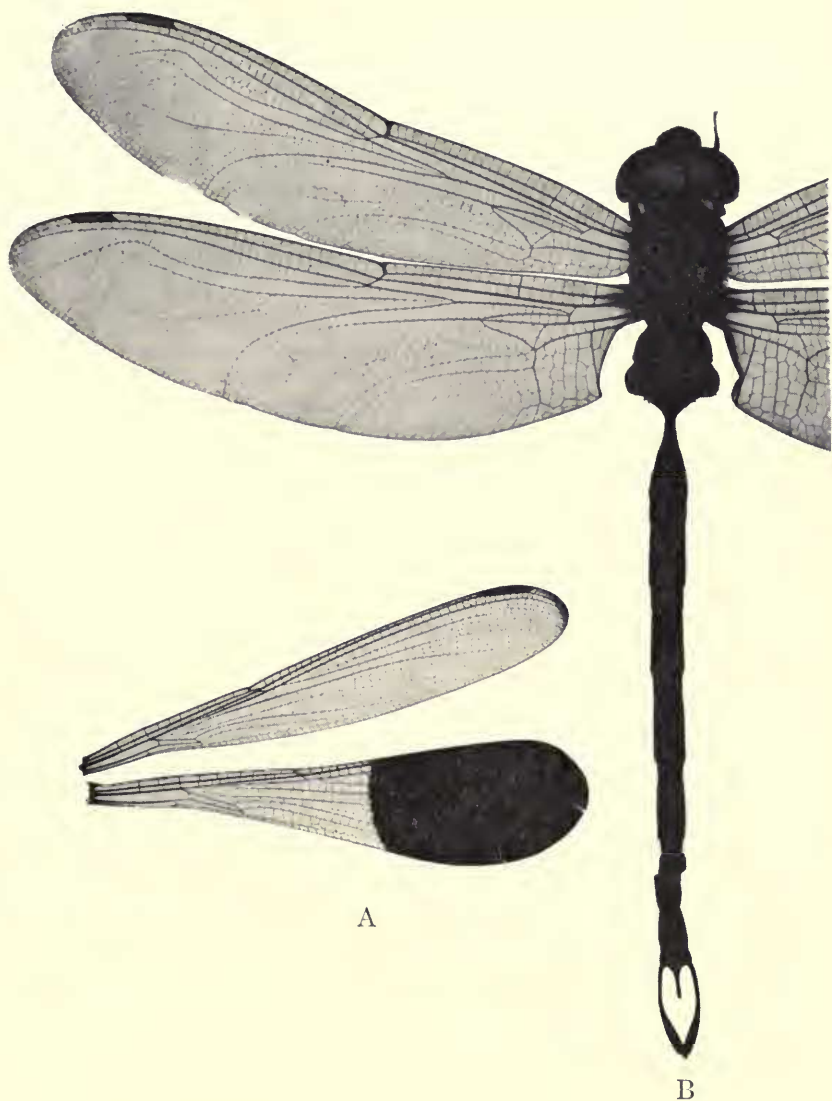


FIG. 44. A, *Rhinocypha sanguinolenta*, new sp., male paratype; right wings. Length of hind wing 27.4 mm. Mindanao. B, *Gynacantha alcatheae*, new sp., male holotype. Total length of body 72.6 mm. Mindanao.

lected September 7, 1946, by Floyd G. Werner. In the collection of Chicago Natural History Museum.

Paratypes.—Two adult males, same data as the holotype, and another, same locality and collector but taken at 2,800 feet altitude, August 29, 1946. One paratype in the collection of Chicago Natural History Museum, two in the collection of the Leiden Museum.

Remarks.—It is interesting to note that the present specimens of *R. sanguinolenta* were collected on the east slope of Mount McKinley on a slightly lower level than the two *turconii* discussed earlier in this paper.

Family Epallagidae

Euphaea amphicyana Ris

Euphaea amphicyana Ris, 1930, Mitt. Münch. Ent. Ges., 20: 88 (key), 89–90, Taf. V, fig. 4 (male, wings; Mindanao); Needham and Gyger, 1939, Philippine Jour. Sci., 70: 245 (key), 247, pl. 12, figs. 154–155 (male, app., Mindanao).

The collection contains two specimens of this beautiful insect, the male unfortunately lacking most of the abdomen but applying perfectly to Ris's description and wing photograph. The female may be described as follows:

Female (allotype).—Labium yellow-brown, the prementum obscured, the median lobes tipped with black, the surface pruinulent blue. Mandible-bases and genae bright chrome, the apical half of the mandibles black; labrum chrome bordered with black and with a mid-basal longitudinal impressed spot of the same color. Clypeus glossy black, the postclypeus with a pair of minute yellow spots above. An irregular transverse band of chrome-yellow in front of the frons connects the eyes and occupies also the antennal sockets anteriorly; a trifid black patch in the middle of its upper surface. Rest of the head mat black except for a pair of conspicuous squarish yellow dots, one on each side between the lateral ocellus and the base of the antenna. Antennae black.

Pro- and synthorax mat black, richly adorned with dull orange-yellow, as follows: Anterior lobe of prothorax laterally; a circular spot on mid-dorsum of pronotum and a large patch occupying most of propleurae; a line bordering the entire posterior lobe of prothorax; antehumeral and humeral mesepisternal stripes broadly confluent below and above, enclosing a pair of narrowly lanceolate black marks, the ventral portions of the light stripes widest; similar stripes, confluent above and open below, forming a long U-shaped mark on mesepimerum, the arm running along the first lateral suture wider than the one parallel to the humeral suture; a broad band covering most of the metepisternum but excluding the spiracle, this band about twice as broad as the black stripe over the first suture; similar stripes, confluent above and open below, forming a broad U-shaped mark on the metepimerum, the posterior portion of the infraepisternites of meso- and metapleurae, and the ventral surface of the thorax.

Legs black; coxae, trochanters and inner surface of all femora in basal half, greenish yellow.

Wings transparent, bases diffusely saffronated; anterior wing otherwise subhyaline, extreme apices enfumed; posterior wing more deeply though diffusely stained with brownish yellow, a postero-marginal area between arculus and nodus subhyaline. Pterostigma brown.

Abdomen very robust, segments 1-7 almost cylindrical. Ground-color ochraceous-orange, marked continuously with black dorsally and along lower tergal margin, the stripes thus formed increasing gradually in breadth from base to apex of abdomen. Ground-color ochraceous-orange, but dorsum and sides of all segments marked longitudinally with black, the black forming two bands which are obliterated and broken into spots on segment 1, and a spot and dash on segment 2; the bands become progressively wider on the succeeding segments so as to leave a continuous light-colored lateral band, very broad on the basal segments, considerably narrowed and almost linear on segments 6 and 7, all bands transversely widened immediately before the posterior margin of each; segments 8 and 9 black, each bearing a yellow lateral patch constricted in the middle and widest apicad; segment 10 wholly black.

Valves relatively small, reaching basal half of segment 10; color black, but apex of outer pair yellowish; distal portion of lower edge with 14-16 minute serrations. Anal appendages almost twice as long as segment 10, slender, pricker-shaped with finely acuminate tips.

Measurements.—Male, fore wing 39.5 mm., hind wing 36.0 mm., pterostigma of fore wing 3.0 mm.; female, abd. + app. 36.5 mm., fore wing 39.0 mm., hind wing 36.5 mm., pterostigma of fore wing 3.0 mm.

Our individuals are considerably larger than Ris's two specimens (abd. 33, fore wing 31, hind wing 28 mm.) and Needham's four males (abd. 38, hind wing 31 mm.). These differences in size are probably due to the different altitudes at which the insects were taken. Many instances are known of mountain populations of zygopterous *Odonata* from the Malay Archipelago and New Guinea that are superior in size to those occurring in the hills and low country.

Material examined.—A male (abdomen partly missing) and female (adult), east slope of Mount McKinley, Davao Province, Mindanao, 2,500 feet, collected September 7, 1946, "rocky stream" (male), and 3,200 feet, September 8, 1946 (female), allotype, by F. G. Werner. In the collection of Chicago Natural History Museum.

Family Platystictidae

Drepanosticta halterata (Brauer). Figures 45, A; 46, D, E.

Platysticta halterata Brauer, 1868, Verh. zool.-bot. Ges. Wien, 18: 551-552 (male and female, "Luzon, Mindanao"); Selys, 1886, Mém. cour. Acad. Belg., 38, (4), pp. 153-154 (type male only, Luzon).

Drepanosticta halterata Cowley, 1936, Trans. Roy. Ent. Soc. London, 85: 166 (note, not seen); Needham and Gyger, 1939, Philippine Jour. Sci., 70: 263-264 (key and note, not seen).

This species has been well described by Brauer and de Selys, and Cowley has given a paraphrase of the distinctive characters of the type. The original description is based on a single male and some immature females ("Alle mir vorliegenden Stücke sind schlecht erhalten, sehr unreif"), and therefore can be ignored. The holotype,

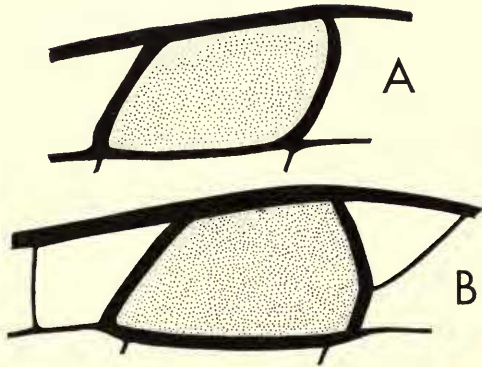


FIG. 45. Pterostigma of right fore wing: A, *Drepanosticta halterata* (Brauer), male holotype; Luzon. B, *D. philippa*, new sp., male paratype; Luzon. Drawn on the same scale.

now before me, bears three written labels: "Platysticta halterata Brau. Luzon. Mind." (Brauer's writing?), "Platysticta halterata Br. ♂*" (de Selys' writing, * means type), and "586." The juvenile females were discarded by de Selys, who only redescribed the male, giving "Luzon, par M. Semper" as its habitat. The specimen is still in good condition and corresponds exactly with the original description. As it has never been figured I here offer drawings of the prothoracic processes, anal appendages and pterostigma of fore wing (figs. 45, A, and 46, D, E).

D. halterata is immediately distinguished from the next species by having the processes of the posterior prothoracic lobe longer, depressed, expanded and more strongly upcurved apically; it also differs very markedly from *philippa*, new sp., by the absence of any light-colored markings on the sides and under surface of the thorax, the strongly contrasting pale ochreous color of the legs (lacking exterior black femoral stripes), and also by the conspicuously light blue basal marks on segments 2-6 of the abdomen, which are all triangu-

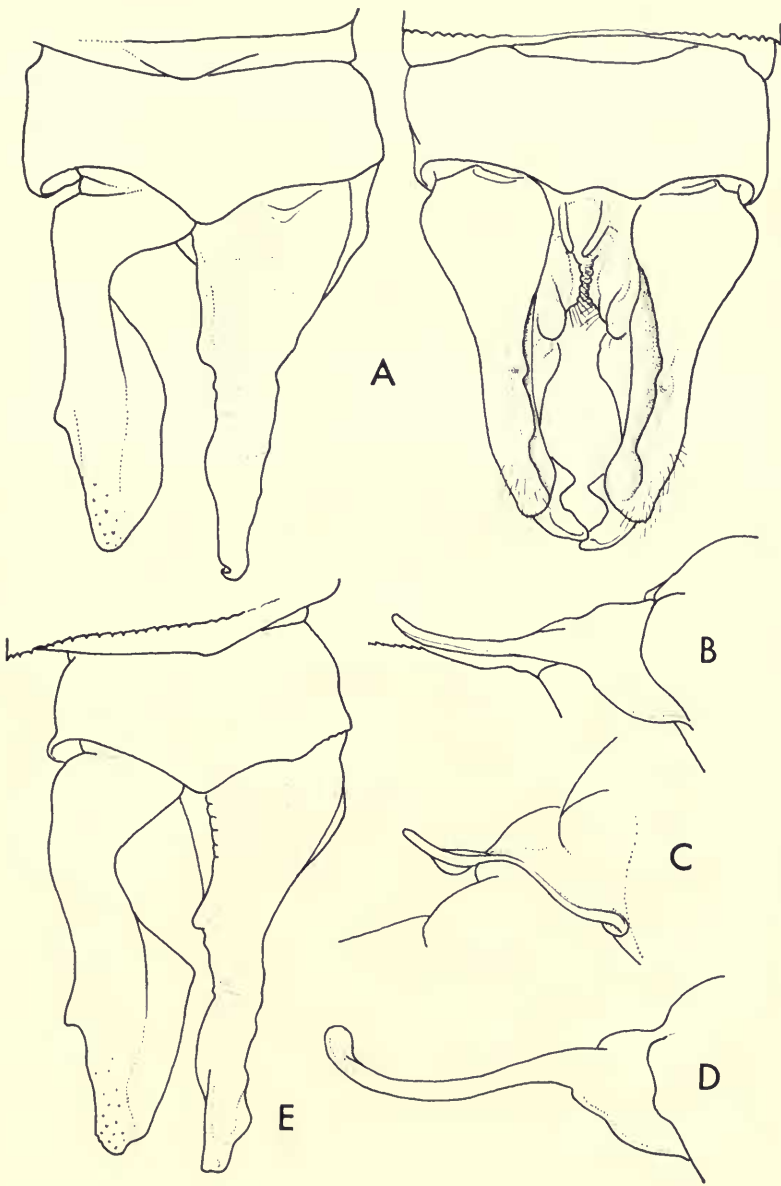


FIG. 46. A-C, *Drepanosticta philippa*, new sp.: A, right side and dorsal views of anal appendages; B, view of right side of posterior lobe of male prothorax; C, the same of female. D, E, *D. hallerata* (Brauer), male holotype; Luzon: D, view of right side of posterior lobe of prothorax; E, view of right side of anal appendages.

larly pointed apically and restricted to the dorsum of the segments. The anal appendages are very similar in the two species, the slight differences being best understood by a comparison (see fig. 46, A, E).

Measurements.—Abd. + app. 35.0 mm., hind wing 24.0 mm.

Female unknown.

Distribution.—Luzon.

Drepanosticta philippa, new species. Figures 45, B; 46, A-C.

Male.—Labium pale brown, median lobe of prementum and palpus black apically; visible part of mandibles, labrum and anteclypeus bright cream, the distal one-third of the labrum sharply defined deep black. Rest of the head bronze-black without any markings, lateral surface of epicranium almost polished. Antennae brown, the second segment yellowish. Parorbital and transverse occipital carinae well developed, the latter acute but with its lateral extremities either scarcely indicated or obtuse-angulate.

Prothorax bronze-black, the surroundings of the spiracle yellow, and occasionally a pair of diffuse pale spots on each side of the anterior lobe and the pronotal tubercles. Posterior lobe (fig. 46, B) produced posteriorly as two widely distant caudally directed lateral processes extending dorsally over the synthorax, in dorsal view parallel, the hind margin of the short median portion almost straight and somewhat impressed in the middle; the tips of these processes tapered and a little uncurved.

Synthorax: dorsum bronze-black as far down as the first lateral suture and including the mesinfraepisternum, the outer border slightly outbent so as to touch the spiracle; posterior to this a cream-colored metepisternal band, not quite reaching the dorsal margin and narrowly interrupted by the spiracle, runs along the first suture; this band is obliquely cut off and widest dorsally, tapering ventrally and below the spiracle continuing as a narrow stripe toward the base of the middle coxae; pleurae marked over the second suture with a broad bronze-black band occupying the posterior half of the metepisternum and the anterior half of the metepimerum; metinfraepisternum and posterior portion of metepimerum pale ochreous, except for a black triangle which fills out the posterior edge of the metepimerum. Ventral surface of thorax unicolorous pale ochreous.

Legs with the coxae, trochanters and most of the femora ochreous; all femora with the somewhat flattened outer faces sharply defined dark brown from base to apex, but with the bristles ochreous; tibiae and tarsi including the bristles also pale-colored, but the inner faces of the tibiae somewhat obscured.

Wings clear, neuration brown. Postnodals 15-17 in fore wing, 14-15 in hind wing. Origin of M_3 and R_s variable, M_3 usually arising at the subnodus and R_s a little beyond that level. Arculus slightly distal to Ax_2 ; quadrangle distinctly widened distally; two subquadrangular antenodal cells; anal veins variable, usually Y-shaped and shortly stalked, but often sessile. Pterostigma (fig. 45, B) with the proximal side very oblique, acute-angulate, the distal side strongly outwardly convex, the costal side shorter than the anal side; cells between C and R_1 distal to pterostigma undivided (first cross-vein abnormal in the fore wing figured), about twice as high as broad; color snuff brown.

Abdomen almost wholly bronze-black, the intersegmental membranes brown and the sternites of segments 1-2 bright yellow; bases of tergites 2 and 3 indistinctly yellowish laterally, tergites 4-6 or 7 bearing diffuse pale basal rings, rather obscured dorsally, somewhat more brightly yellow laterally and extending much farther apical along the lower tergal margin than above, occupying about the basal one-seventh; tergites 8-10 unmarked, except for an indistinct yellowish basodorsal spot on 9 (two paratypes).

Anal appendages black, shaped as in figure 46, A; distal portion of superior pair somewhat hollowed out intero-dorsally, the extero-dorsal ridge yellowish; inferior appendages a trifle longer than the superiors, color black but outer surface sometimes yellowish basally.

Female (allotype).—Differs from the male only as follows: Prothorax (fig. 46, C) with the processes of the posterior lobe a little shorter but similar in shape. Synthorax with yellow metepisternal band a little wider and not obliterated at the spiracle; pleural dark brown band over the second suture less sharply defined posteriorly; exterior dark stripe of femora ill defined, dark brown instead of black, but widening at extreme apex so as to form blackish knee-spots. Postnodals 16 in fore wing, 15 in hind wing; Y-vein shortly stalked; pterostigma as in the male.

Abdomen of robust shape, segments cylindrical, from base of segment 4 as far as the apex of segment 6 gradually expanded; posterior border of segment 1 raised and slightly thickened. Color as in male, but dorsum of segments 1 and 3 yellowish basally; intersegmental membrane between segments 8 and 9 yellowish; segment 9 with a pair of very large greenish yellow dorso-lateral patches occupying most of the tergite and divided longitudinally by brown on mid-dorsum; segment 10 very short, its posterior margin somewhat produced backward in the middle. Anal appendages light brown, equal in length to segment 10 mid-dorsally, shaped like an equilateral triangle and distinctly flattened dorso-ventrally. Genital valves not surpassing apex of appendages, color light brown, inner gonapophyses with a deep black ventro-basal spot.

Measurements.—Male, abd. + app. 37.5-41.0 mm., hind wing 25.0-27.0 mm.; female, 37.0, 26.5 mm.

Holotype.—An adult male from Massisiat, Abra Province, Luzon, collected along a creek in a mountain gully, May 21, 1946, by H. Hoogstraal. In the collection of Chicago Natural History Museum.

Allotype.—An adult female, same data and repository as the holotype.

Paratypes.—Five adult males, same data as the holotype. Two in the collection of Chicago Natural History Museum, three in the collection of the Leiden Museum.

Drepanosticta lestoides (Brauer). Figure 47.

Platysticta lestoides Brauer, 1868, Verh. zool.-bot. Ges. Wien, 18: 552-553 (male, Mindanao); Selys, 1886, Mém. cour. Acad. Belg., 38, (4), pp. 154-155 (type male).

Drepanosticta lestoides Cowley, 1936, Trans. Roy. Ent. Soc. London, 85: 166 (note, not seen); Needham and Gyger, 1939, Philippine Jour. Sci., 70: 263, 264 (key and note, not seen).

Not represented in the collection, but a male from Mindanao in the Senckenberg Museum, which in June, 1938, I was able to compare with Brauer's type in the Brussels Museum, agrees with that specimen in every detail.

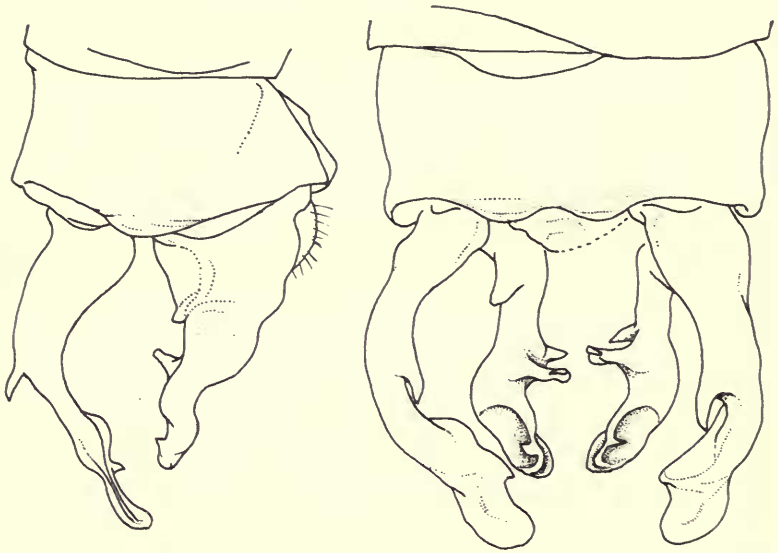


FIG. 47. *Drepanosticta lestoides* (Brauer), male homotype; anal appendages, right side and dorsal views; Mindanao.

D. lestoides is a brightly colored insect of large size and very slender build. It is easily distinguished from its regional congeners by a combination of characters, the simply rounded, broadly collar-shaped posterior lobe of the prothorax and the complex structure of the anal appendages being the most outstanding. The following additional notes are taken from the second specimen (homotype).

Labrum, anteclypeus and upper half of mandible-bases light cream, the labrum narrowly bordered with black. Upper surface of head rather strongly concave, shiny metallic green; transverse occipital carina lacking protuberant side-angles. Prothorax, except for the light brownish posterior lobe, bright lemon yellow, as are also the sides of the synthorax and coxae of legs; lateral thoracic band broad, sharply defined, deep black; most of the metepimerum and ventral surface of the thorax yellow. Postnodals 15-16 in fore wing, 14-15 in hind wing; Y-vein almost sessile; M_3 arises at or a little proximal to the subnodus, R_s slightly less than half

a cell farther distad. Pterostigma longer than high, the proximal side distinctly oblique, acute-angulate, the distal side almost straight, rectangular; color brown, surrounded by a fine yellow line.

Abdomen long and slender. Sides of segments 1-2 green; basal dorso-lateral yellow annules of segments 3-5 not sharply defined. Anal appendages shaped as in figure 47.

Measurements.—Abd. +app. 45.0 mm., hind wing 25.7 mm.

Female unknown.

Distribution.—Mindanao.

Material examined.—The type from Mindanao in the Brussels Museum, and a male (homotype), also from Mindanao, Surigao, October 30, 1915, collected by G. Boettcher, in the Natur-Museum Senckenberg, Frankfurt-a.-M. (F. Ris's collection).

***Drepanosticta annulata* (Selys).**

Platysticta annulata Selys, 1886, Mém. cour. Acad. Belg., 38, (4), pp. 156-157 (female, "Luçon par M. Semper").

Drepanosticta annulata Cowley, 1936, Trans. Roy. Ent. Soc. London, 85: 166 (note, not seen).

I have before me two of the three very immature females recorded by de Selys at the end of his description and these are the only specimens still in existence. The third female, which presents the "anomalie singulière: le rudiment du secteur inférieur du triangle manquant tout à fait, comme chez la *Protosticta simplicinervis* . . .," is not among these and was probably lost.

Only the basal segments of the abdomens are intact, the missing segments being 4-10 and 6-10, respectively. Both individuals are, moreover, shrivelled and quite unfit for redescription.

A close inspection of the prothoraxes of the two specimens reveals that considerable differences in the form of the posterior lobe exist between them, only one of the females agreeing reasonably well with the description of that part of the body. This leads me to conclude that the two insects are not even conspecific.

Among about half a dozen undescribed species of *Drepanosticta* available for study in the Natur-Museum Senckenberg (the late F. Ris's collection), I found no females whose prothorax structure corresponds exactly with either one of de Selys' *annulata*, which is unfortunate. *Platysticta annulata* Selys—though correctly referred to *Drepanosticta* by Cowley—thus being a composite species, I have selected one of them as the lectotype, but the identity of both specimens must be left in abeyance.

Material examined.—Two females (imperfect), nos. 17 and 18, belonging to two different species: (a) labeled "577" (original number), "74" (printed), and "Platysticta annulata" (yellow, de Selys' writing), lectotype *annulata* by present designation; (b) labeled "588" (original), and "Platysticta annulata" (yellow, de Selys' writing); both in the Institut Royal des Sciences Naturelles de Belgique, Brussels.

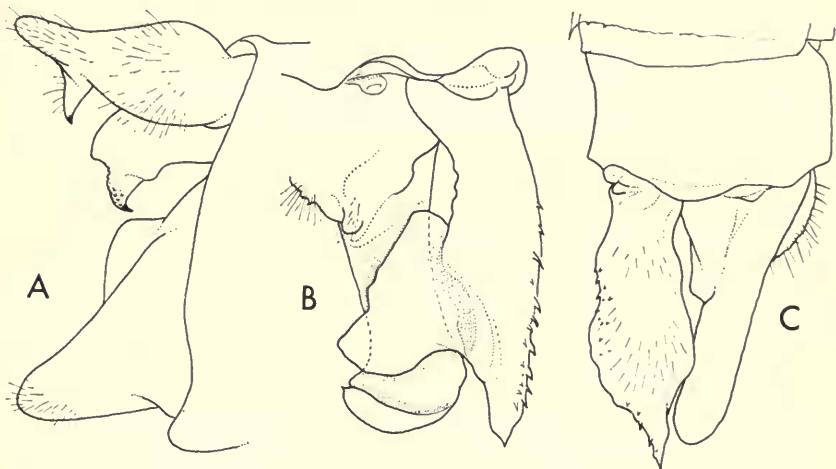


FIG. 48. A, *Prodasineura palawana* Lieftinck, male; anal appendages; Busuanga Island. B, C, *Coelliccia werneri*, new sp., male; Palawan Island: B, intero-dorsal view of right pair of anal appendages; C, view of right side of same, less strongly magnified.

Family Protoneuridae

Prodasineura palawana Lieftinck. Figure 48, A.

Prodasineura palawana Lieftinck, 1948, *Treubia*, 19: 232-234, fig. 4 (male app., Palawan).

This species is represented in the collection by a male in good condition. It agrees in every respect with the type in the Brussels Museum. The anal appendages of the male are quite characteristic (fig. 48, A). The female is still unknown. *P. palawana* is most closely related to *P. hosei* (Laidlaw), from Borneo.

Material examined.—One male, Dimaniang, Busuanga Island (Calamianes), Palawan Province, March, 1947, near sea level, H. Hoogstraal. In Chicago Natural History Museum.

Distribution.—Palawan and Busuanga Island.

Family Platycnemididae

Coeliccia weneri, new species. Figure 48, B, C.

The only other species of *Coeliccia* known from Palawan is *C. palawana* Lieftinck (Treubia, 17: 358-359, fig. 13, male app., 1940). This also possesses a squarish pterostigma and agrees with *weneri* in the distal origin of the veins M_3 and R_s , but the color-scheme of the body of *palawana* and the shape of its anal appendages are altogether different from those of *weneri*. This fine new insect is dedicated to its discoverer, Mr. Floyd G. Werner.

Male (adult).—Labium pale ochreous. Labrum blue-green bordered with orangish anteriorly; mandible-bases, genae and anteclypeus blue, the mandibles chestnut apically; postclypeus glossy black; vertical surface of frons yellow-brown, the remainder black; vertex and epicranium bronze-black, a vestige of a bluish spot on either side of the median ocellus, a larger circular spot between each lateral ocellus and the eye-margin, and a pair of large, oblique, oval or pear-shaped postocular blue spots along the occipital margin; rear of head black with a broad blue band along the eye-margin confluent anteriorly with the blue of the genae. Antennae with the first two segments yellow, the second with a black apical ring.

Dorsum of prothorax mat black, the sides, including the outer surface of the conical pronotal tubercles, blue; anterior and posterior lobes black, the latter of rather large size, depressed, collar-shaped, the surface convex, the hind margin very slightly emarginate in the middle, the side-edges rounded.

Dorsum of synthorax bronze-black as far down as the first lateral suture. the outer border surpassing it only near the upper end where it sends out a tiny projection invading the blue of the sides, then continues downward exactly parallel to the humeral suture to the anterior margin of the middle coxae; a tiny posterior triangle of the mesinfraepisternite remains blue. Mesepisternum with two elongate juxtahumeral blue spots on each side, the lowermost spot about twice as large as the upper and obliquely cut off dorsally at the level of the pleural spiracle; immediately outside of the upper end of the humeral suture is a third blue spot, much larger than the preceding and more or less squarish in outline. Thoracic sides blue with blackish streaks at the upper end of the second suture, the anterior edge of the metinfraepisternum, and along the postero-ventral border of the metepimerum; ventral surface light ochreous.

Legs pale ochreous, the femora with the knees and a line on the outer faces brownish black; bristles yellowish.

Wings hyaline, venation brown. M_3 arises at or very little distal to the subnodus, R_s about one-fourth of a cell-length distal to it; three postquadrangular antenodal cells in all wings. Quadrangle slightly widened distally, quadrangle of hind wing one-fifth longer than that of fore wing; costal side almost twice as long as distal side in fore wing, almost two and a half times as long in hind wing; Ac situated midway between Ax_1 and Ax_2 and coincident with Ab at wing margin; medio-anal link broken in all wings; 17-18 postnodals in fore wing, 16-17 in hind wing. Pterostigma not very oblique, rather squarish and even a little higher than long, the costal side slightly shorter than the others; color grayish black but conspicuously margined with white and heavily framed in black.

Abdomen slender, from the base of segment 7 to the end of segment 9 gradually a little expanded, thereafter parallel-sided. Ground color pale brown marked with yellow, darker brown and blue. Segments 1-2 with ill-defined brownish band above, the sides bluish; posterior border of both segments finely obscured and a black basal dot along the lower margin of 2; segments 3-7 with the brown on the dorsum also ill-defined and rather constricted toward the end, forming yellowish subapical latero-ventral lunules before the dark brown end rings; segment 8 blackish brown, the distal third sharply defined blue; segment 9 wholly blue except for a black stripe along the lower tergal margin; segment 10 black with the dorsum wholly blue.

Anal appendages black, the dorsal postmedian ridge of the superior pair whitish; inferior appendages only slightly shorter than the superiors, shaped as in figure 48, B, C.

Measurements.—Abd. + app. 36.0-36.8 mm., hind wing 22.3-23.3 mm.

Female unknown.

Holotype.—An adult male from the mountains west of Lapulapu, Iwahig, Palawan Island, collected at 2,000-3,000 feet altitude, March 1-2, 1947, by Floyd G. Werner. In the collection of Chicago Natural History Museum.

Paratype.—An adult male, same data as the holotype, in the collection of the Leiden Museum.

Coeliccia dinoceras Laidlaw. Figure 49, A, B.

Coeliccia dinoceras Laidlaw, 1925, Philippine Jour. Sci., 28: 562-563, figs. 2-3 (male, app. and prothorax, Lanao, Mindanao); 1932, Rec. Ind. Mus., 34: 12 (key), 33-34, pl. I, figs. 2 and 18 (male, penis, same specimen); Needham and Gyger, 1939, Philippine Jour. Sci., 70: 268-269, pl. 17, figs. 249-251 (male, app. and prothorax, Mindanao).

The collection contains two adult males of this peculiar species, which structurally do not seem to differ from the type or from Needham's specimen, which also came from Mindanao. The color pattern of *dinoceras* is so closely similar to that of the next species that it will suffice to point out the differences and give camera lucida drawings of the remarkable prothorax (fig. 49, B) and appendages (fig. 49, A) of *dinoceras* for comparison with the structures of *exoleta*, new sp.

The transverse blue marks connecting the lateral ocelli with the eye-margin are abruptly narrowed outwardly, and the postocular blue spots are smaller, placed more inward and completely isolated. The antennae are colored as in *exoleta* (not white as stated in the original diagnosis). The blue pronotal spots are larger than in *exoleta* but the upper portion of the antehumeral stripes is more nearly linear. The pterostigma, though rather squarish in outline, is more oblique and slightly more inflated than in the allied species.

Segment 1 of the abdomen has only a narrow longitudinal line of black mid-dorsally, as described by Laidlaw, but segment 8 is black with the exception of a

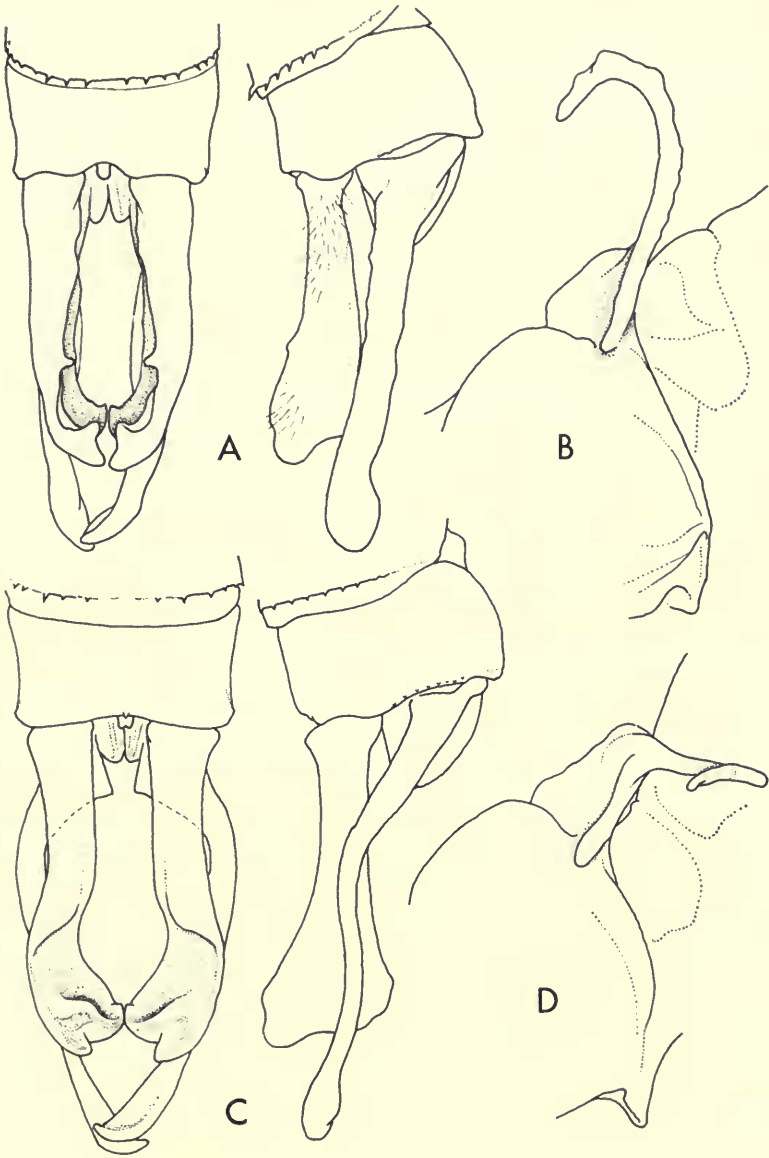


FIG. 49. A, B, *Coeliccia dinoceras* Laidlaw, male; Mindanao: A, dorsal and right side views of anal appendages; B, view of left side of posterior portion of prothorax. C, D, *Coeliccia exoleta*, new sp., male; Mindanao: C, dorsal and right side views of anal appendages; D, view of left side of posterior portion of prothorax.

pair of triangular bluish apical spots invading the black from below; segments 9 and 10 are blue, but 9 has a black basal stripe that extends from the base forward along the latero-ventral margin.

Appendages black, but the small tubercle and the rounded carina following it along the upper border toward the apex of the superior pair are white; as in *exoleta*, the inner surfaces of the inferior appendages are clear yellow basally.

Measurements.—Abd. + app. 42.5 mm. (inf. app. 2.0 mm.), hind wing 26.5–27.0 mm.

Material examined.—Two males (adult), Burungkot Upi, Cotabato Province, Mindanao, 1,500 feet, collected January 9, 1947, by F. G. Werner.

Our specimens are considerably larger than Laidlaw's type of *dinoceras*, which measures 36.25 mm. for the abdomen and the appendages (1.25 mm.) and 25 mm. for the hind wing. They are only little smaller in size than *exoleta*, but the two insects are easily distinguished by the different structure of the prothorax and anal appendages.

The female of both species is still unknown.

Distribution.—Mindanao.

Coeliccia exoleta, new species. Figure 49, C, D.

This conspicuous new species is closely allied to *C. dinoceras* Laidlaw, described above, which is smaller and has a differently shaped prothoracic hind lobe, the long-drawn appendages of *exoleta* being of a still more exaggerated type.

Male (adult).—Labium bright ochreous, palpi black. Labrum glossy black; mandible-bases and the anterior surface of the head to the fronto-clypeal suture light green, but the postclypeus polished black except for a circular green spot on each side at extreme base; vertex and epicranium mat bronze-black, the upper surface marked on either side with a rather irregular elongate stripe extending obliquely from the lateral ocellus to the margin of the compound eye; there is also a pair of widely distant, inwardly projecting, oblique blue "postocular" bands situated on either side of the occipital carina, each of them attached laterally to a similarly colored band of the same width that runs along the eye-margin until it meets the blue color of the genal area underneath; rear of the head otherwise black. Antennae black, only the base of the second segment light yellow.

Prothorax black on the dorsal surface, the upper half of the propleurae and both anterior and posterior lobes; pronotum with a large blue spot on either side of the middle. Posterior lobe broader than long, the dorsal surface convex, carrying a pair of widely distant, somewhat twisted, S-shaped lateral horns, which are directed obliquely sidewise and backward, the posterior border of the median portion of the lobe almost straight; the rounded lateral angles also a little protuberant (fig. 49, D).

Dorsum of synthorax black; laterally the black color reaches the first suture, its perfectly straight margin running exactly parallel to the humeral suture; mese-

pisterna with a pair of blue antehumeral stripes, one on either side somewhat internal to the humeral suture, widest below and not entirely reaching the upper margin; outer mesostigmal lamina also blue; to the outside of the humeral suture, close to the ante-alar sinus, is a small spot of the same color. Thoracic sides blue, including a tiny postero-ventral triangle of the mesinfraepisternum, with a narrow band of black along the second suture; this is continued dorsally along the upper margin of the metapleurae but ventrally tapers away at the metinfraepisternal suture, the opposite edge of the metinfraepisternum being filled out by a lozenge-shaped black dot. Ventral surface yellow.

Legs (except the trochanters posteriorly) light ochreous; outer faces of all femora and inner faces of tibiae and tarsi heavily striped with black, the claws and bristles also obscure.

Wings hyaline, venation black. M_3 arises at or a little distal to the subnodus, R_s one-fourth to one-third of a cell-length distal to it; three postquadrangular antenodal cells. Quadrangle distinctly widened distally, quadrangle of hind wing one-fifth longer than that of fore wing; costal side scarcely one-third longer than distal side in fore wing and almost twice the length of distal side in hind wing. Ac situated midway between Ax_1 and Ax_2 and coincident with Ab at the margin; medio-anal link broken in all wings; 15-16 postnodals in fore wing, 14 in hind wing. Pterostigma almost square, the proximal side hardly noticeably more oblique than the distal; color deep black between black nervures.

Abdomen very long and slender, from the middle of segment 6 to the end of 9 gradually a little expanded. Segment 1 blue changing to yellow laterally, dorsum with an X-shaped black mark from base to apex, the intersegmental ring brown; segment 2 with a similar though less constricted black dorsal mark attached to a narrow black posterior ring, its sides ferruginous changing to blue laterally; segments 3-7 with the dorsum black except for a pair of very small dorso-lateral bluish streaks at extreme base, vestigial on 4 and 5, absent on 6 and 7, the black of dorsum ill-defined laterally, passing to reddish brown and finally to yellow underneath; segment 8 black except for two pairs of subapical points of blue color placed in a transverse row near apex of segment; basal two-fifths of segment 9 black, the remainder blue save along ventral margin; segment 10 all blue, changing to ochreous ventrally.

Anal appendages very long, the cylindrical vermiform inferiors longer than segments 9 and 10 taken together, shaped as in figure 49, C; color black, but the inner surface of the basal portion of the inferior pair yellow, the inner concavity of the expanded apices of the superior pair also lighter in color.

Measurements.—Abd.+app. 44.0-47.0 mm. (inf. app. 2.3 mm.), hind wing 27.0-28.5 mm.

Female unknown.

Holotype.—An adult male from the east slope of Mount McKinley, altitude 2,500 feet, Davao Province, Mindanao, collected September 7, 1946, by Floyd G. Werner. In the collection of Chicago Natural History Museum.

Paratype.—An adult male, same locality as the holotype, collected at 2,800 feet altitude, August 24, 1946. In the collection of the Leiden Museum.

Risioenemis appendiculata (Brauer)

Hypocnemis appendiculata Brauer, 1868, Verh. zool.-bot. Ges. Wien, 18: 548 (male, Mindanao); Selys, 1882, Anal. Soc. Espan. Hist. Nat., 11: 27 (same specimen); Selys, 1886, Mém. cour. Acad. Belg., 38, (4), pp. 98 (key), 105-106 (additional males, Mindanao).

Prionocnemis appendiculata Needham and Gyger, 1939, Philippine Jour. Sci., 70: 270 (key), 276, pl. 14, figs. 181-182 (app., male, Mindanao).

Our specimens agree with the existing descriptions and figures, except that all of them show at least traces of rather broad pale-colored apical rings to the abdominal segments 3-5 (or 3-6) which are not mentioned by the authors. As to size, this is evidently a variable insect (abd. + app., 33.5-36.5 mm., hind wing 21.6-22.5 mm.).

Material examined.—Two males (juv.), Bugusan, Parang, Cotabato Province, altitude 50 feet, Mindanao, December 10, 1946, collected by F. G. Werner. In the collection of Chicago Natural History Museum. One male (adult), Parang, Cotabato Province, Mindanao, January 13, 1954, collected by H. Townes. In the Leiden Museum.

Distribution.—Mindanao.

Risioenemis atripes (Needham and Gyger)

Prionocnemis atripes Needham and Gyger, 1941, Philippine Jour. Sci., 74: 146, pl. 1, figs. 11, 13 and 14 (male and female, structures; Mindanao).

The type of this species is from Mount Apo, altitude 6,500 feet. We have two males which agree closely with the description and figures.

Material examined.—Two males (adult), from Agusan, Bukidnon, altitude 1,000 feet, Mindanao, collected July 27, 1946, by H. Hoogstraal and M. Celestino. One in the collection of Chicago Natural History Museum, the second in the Leiden Museum.

Distribution.—Mindanao.

Risioenemis atropurpurea (Brauer)

Hypocnemis atropurpurea Brauer, 1868, Verh. zool.-bot. Ges. Wien, 18: 549-550 (male, Manila); Selys, 1882, Anal. Soc. Espan. Hist. Nat., 11: 23 (key), 24 (same specimen); Selys, 1886, Mém. cour. Acad. Belg., 38, (4), pp. 98 (key), 101 (same specimen).

Prionocnemis atropurpurea Needham and Gyger, 1939, Philippine Jour. Sci., 70: 270 (key), 272-273, pl. 14, figs. 180, 187, 188 and 196 (structures, male and female; Luzon).

Material examined.—A male (adult), Massisiat, Abra Province, Luzon, altitude 950 meters, May 21, 1946, collected along a creek

in a mountain gully, by H. Hoogstraal. In the collection of Chicago Natural History Museum.

Distribution.—Luzon.

Risiocnemis ignea (Brauer)

Hypocnemis ignea Brauer, 1868, Verh. zool.-bot. Ges. Wien, 18: 547 (male and female; Luzon); Selys, 1882, Anal. Soc. Espan. Hist. Nat., 11: 23 (key), 26 (same specimens); Selys, 1886, Mém. cour. Acad. Belg., 38, (4), pp. 98 (key), 103-104 (same specimens).

Prionocnemis ignea Needham and Gyger, 1939, Philippine Jour. Sci., 70: 270 (key), 275, pl. 14, fig. 174 (female prothorax; Luzon); 1941, op. cit., 74: 147-148, pl. 1, figs. 17-18 (male app.; Mindanao).

Material examined.—A male (juv.), Baguio-Bontoc road, about 65 km. from Baguio, Mountain Province, altitude 7,400 feet, Luzon, April 23, 1946, "at damp rock cliff," collected by H. Hoogstraal and D. Heyneman. A male and female (adult), Massisiat, Abra Province, altitude 950 meters, Luzon, May 21, 1946, collected along a creek in a mountain gully, by H. Hoogstraal. In the collection of Chicago Natural History Museum.

Distribution.—Luzon and Mindanao.

Suborder Anisoptera

Family Gomphidae

Heliogomphus olivaceus, new species. Figure 50.

This new species is the first of its genus to be reported from the Palawan Province of the Philippine Islands. Geographically its nearest neighbors are *H. bakeri* Laidlaw, from Luzon and Negros, and *blandulus* Lieftinck, from western Borneo.

H. bakeri differs from our species in the less pronounced exterior tooth and the feebly recurved apices of the superior appendages, and also by having two black stripes on the thoracic sides. *H. blandulus* has rather similar appendages, but the exterior tooth of the superiors is not nearly so strong, the apices on the other hand being definitely more curled; both species agree in having the sides of the thorax immaculate, but *blandulus* is easily recognized by having the antehumeral bands separated from the mesothoracic collar. The most recent revision of the genus is that given by Fraser (1942, Trans. Roy. Ent. Soc. London, 92: 333-341, figs.).

Male (adult).—General coloring chamois and light yellowish olive, head and thorax sparsely marked with dark brown.

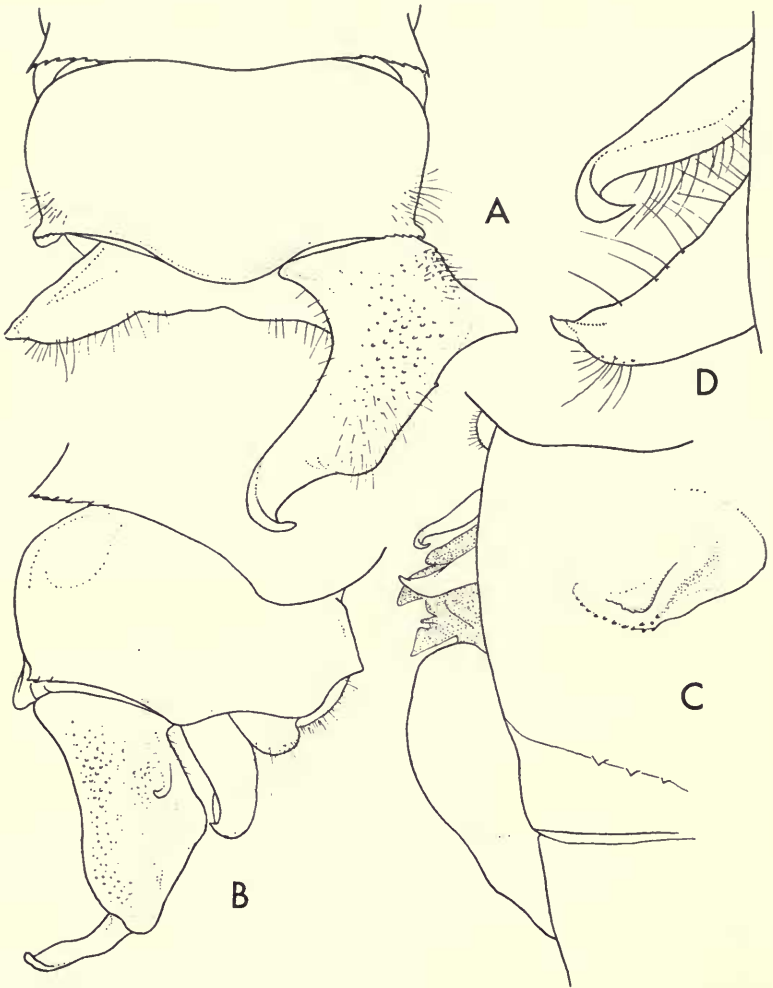


FIG. 50. *Heliogomphus olivaceus*, new sp., male holotype; Busuanga Island: A, B, dorsal and right side views of anal appendages; C, view of left side of genitalia; D, hamuli (more highly magnified).

Labium chamois, the mouth-parts, frons and anterior half of the vertex yellowish green; vertex above brown changing to almost black posteriorly; occiput slightly swollen, its posterior margin feebly concave in dorsal view, color dark brown; rear of the head greenish yellow.

Prothorax blackish above, sides light yellowish olive. Synthorax unicolor light yellowish olive; mesoprescutum blackish brown; dorsum blackish brown to a level about 0.4–0.7 mm. before the humeral suture, the outer border of the black area rather strongly outwardly convex, marked with a pair of light yellowish olive antehumeral bands, widest about midway their length, slightly converging dor-

sally and confluent with the mesothoracic collar so as to form 7-shaped marks not quite reaching the ante-alar sinus, the transverse basal portions of these bands short, tapered and meeting at the base of the mid-dorsal crest. Thoracic sides and ventral surface unmarked.

Legs greenish yellow, anterior and middle femora with a broad, ill-defined, black stripe on the outer side, posterior femora similar but more gradually darkening toward the ends; tibiae and tarsi black; posterior femur distinctly curved, reaching back as far as the apex of the first abdominal segment.

Wings hyaline, venation blackish brown including the costa anteriorly; antenodals 12-13 in fore wing, 9-10 in hind wing, postnodals 11 and 10-11, respectively; 1-2 *Cux* in fore wing, 1 in hind wing; one row of postanal cells in fore wing; 2 cells under the internal triangle of hind wing. Discoidal field of fore wing gradually a little expanded from the base outward, with two cell-rows up to a level of the nodus, from which point M_4 and Cu_1 become more strongly divergent, with 9-10 marginal cells; anal triangle three-celled, the middle cell largest and pentagonal in shape. Pterostigma lacking a brace-vein except in left fore wing, relatively of large size, surmounting $4-4\frac{1}{2}$ cells; color tawny olive.

Abdomen slender, the apical segments strongly expanded; color predominantly dark brown marked with greenish yellow; segments 1-2 greenish yellow, segment 1 obscured above; segment 2 with the dorsum dark brown as far laterad as the auricles, this color divided medially by a yellow stripe (expanded halfway its length) that runs from base to apex; segments 3-7 and basal half of segment 8 with the mid-dorsal carina finely yellow and with a greenish ochreous lateral oval spot at the base of each segment, these spots occupying from one-fifth to one-fourth of the segments' length; on segment 7 they are somewhat enlarged, forming together a basal ring occupying one-fourth of total length; lower half of distal portion of same segment also pale-colored; segments 8-10 brownish black, the sides dirty orange; dorsal surface of segment 10 almost polished, its posterior border thickened; sternal surface of segments 8 and 9 greenish ochreous. Genital organs shaped as in figure 50, C, D; color of the vesicle deep black.

Anal appendages of the usual generic lyrate shape; basal half of superior pair black, the distal portion greenish yellow; inferior appendage brownish yellow (fig. 50, A, B).

Measurements.—Abd.+app. 28.6 mm., hind wing 25.0 mm., pterostigma of fore wing 2.0 mm.

Female unknown.

Holotype.—An adult male from Dimaniang, Busuanga Island (Calamianes), Palawan Province, collected near sea level, March, 1947, by H. Hoogstraal. In the collection of Chicago Natural History Museum.

Family Aeshnidae

Gynacantha alcatheae, new species. Figures 44, B; 51, A; 52.

Belongs to a group of closely allied species apparently centered in "Wallacea," an area roughly comprising the Philippine subregion,

Celebes and the northern Moluccas. A revision of this group and of some annectent forms of the neighboring islands, with a key to the known species, was given by Lieftinck (1948, *Treubia*, 19: 417-428, figs.).

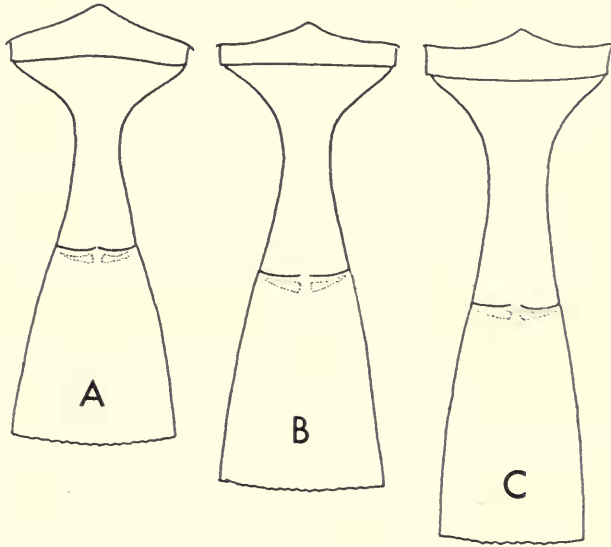


FIG. 51. Dorsal view of third abdominal segment (including second intersegmental membrane): A, *Gynacantha alcatheae*, new sp., male holotype; Mindanao. B, *G. penelope* Ris, male; northern Celebes. C, *G. pasiphae* Lieftinck, male holotype; Halmahera. Drawn to the same scale.

The present new species is the first member of this group reported from the Philippine Islands. It is very closely related to both *G. penelope* Ris (Celebes) and *G. pasiphae* Lieftinck (Halmahera and Morotai), more especially to the former.

The body of the unique specimen is discolored and the markings are faded, but the arrangement and color of the pale spots appear to be quite similar to those of *penelope*, described in the paper just mentioned. The photograph reproduced in figure 44, B, may give a better impression of *alcatheae* than a long description, for which the following comparative notes are therefore substituted.

Transverse streak on top of frons dark brown, no trace of a longitudinal stalk, hence no complete T-spot present, as also in the allied species. Body slightly more compactly built than in *penelope*, with the abdominal segments 2-9 all a trifle shorter; and though the inflation of segment 2 and the basal constriction of segment 3 are equally well marked in the two species, segment 3 of *alcatheae* is a little

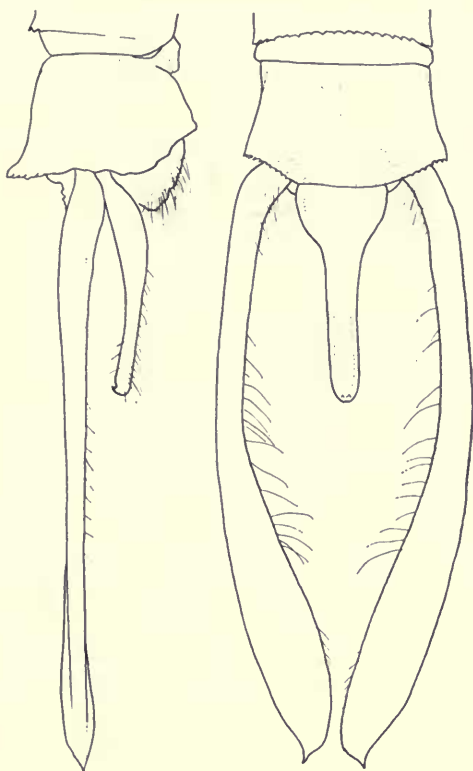


FIG. 52. *Gynacantha alcahoe*, new sp., male holotype; right side and dorsal views of anal appendages; Mindanao.

shorter and hence more abruptly expanded after the constriction than it is in *penelope*. The proportions of segment 3 in the three related species are shown in figure 51, A-C.

There are no traces of pale *MD* spots on segments 4-7 of the abdomen (distinct in *penelope*). Wings shaped similarly to those of *penelope*, but the tips are slightly less broadly rounded; neuration similar. Membrane enfumed, especially at apices; both wings with distinct spots of a rusty brown color at extreme base, ill-defined distally, in fore wing a vestige in *c-sc*, in hind wing in *c-sc*, *m* and *cu* (*penelope*: wing-bases at most slightly yellowish).

Anal appendages shaped similarly to those of *pasiphae* and *penelope*, but superior pair noticeably more abruptly expanded and inwardly curved about half-way their length. The ratios in length of the superior and inferior appendages are approximately the same in all three species (fig. 52).

Measurements.—Abd.+app. 56.6 mm., app. sup. 7.8 mm., hind wing 48.0, pterostigma of fore wing 3.3 mm.

Female unknown.

Holotype.—An adult male from Madaum, Tagum, Davao Province, Mindanao, at sea level, collected October 10, 1946, by Floyd G. Werner. In the collection of Chicago Natural History Museum.

Family Corduliidae

Heteronaias heterodoxa (Selys)

Epiheca heterodoxa Selys, 1878, Bull. Acad. Belg., (2), 45: 192-193 (male; Luzon).

Somatochlora heterodoxa Selys, 1878, op. cit., p. 217; 1882, Anal. Soc. Espan. Hist. Nat., 11: 16 (same specimens).

Procordulia heterodoxa Laidlaw, 1928, Proc. Zool. Soc. London, 1928: 132-133 (male and female; Luzon; notes).

Heteronaias heterodoxa Needham and Gyger, 1937, Philippine Jour. Sci., 63: 57 (key), 60-64, fig. 2 (structures, imago and larva; Luzon).

Few specimens are known of this beautiful dragonfly, which is apparently endemic in the Philippine Islands and takes rather an isolated position. I agree with Laidlaw that it is most nearly related to *Procordulia*. This author's suggestion that *heterodoxa* may ultimately require the creation of a distinct genus appears to be fully justified and was adopted by Needham and Gyger who discovered the larva, which differs very markedly from the immature stages of all known members of *Somatochlora* and *Procordulia*.

Material examined.—A female (adult, in fragments), Mount Data, Mountain Province, Luzon, collected April 3, 1946, by H. Hoogstraal. In the collection of Chicago Natural History Museum. A female (semiadult), San Luis, Mindoro, collected April 17, 1954, by H. Townes. In the Leiden Museum.

Distribution.—Luzon and Mindoro.

Family Libellulidae

Rhyothemis phyllis subphyllis Selys

Rhyothemis phyllis race *subphyllis* Selys, 1882, Anal. Soc. Espan. Hist. Nat., 11: 7 (female, "Luzon, Zébu, Bohol," etc.).

Rhyothemis phyllis subphyllis Ris, 1913, Cat. Coll. Selys, fasc. XV, Lib., 7: 938 (key), 941, pl. V, fig. (wings, female, Bohol; Bohol, Cebu, Mindoro, Luzon).

Rhyothemis phyllis Needham and Gyger, 1937, Philippine Jour. Sci., 63: 84, pl. 5, fig. 71 (wings, sex? loc.?; male and female, Luzon; male, Samar; male, Mindanao).

A subspecies of relatively small size, with the wing membrane distinctly saffronated. The labium is invariably blackish brown, the labrum black and the clypeus for the greater part yellow (postclypeus of male bordered with black); frons with a subinterrupted yellow band anteriorly. Chiefly characterized by the reduced opaque dark markings of the wings, the nodal and apical spots usually being very small or absent altogether and the basal dark markings also averaging smaller in size than in the Moluccan subspecies *p. obscura* Brauer, and *p. snelleni* Selys from Celebes. However, not one of these races is homogeneous and their distinction is often a matter of doubt, because the wing markings are frequently dissimilar in the two sexes and considerable differences exist between populations occurring in different parts of one island, as for instance in Celebes, or island groups (Philippines, Moluccas).

The males of *p. subphyllis* examined by me are all from Mindoro, Mindanao, and Basilan. They lack a nodal spot and agree in having only the extreme apices of the wings obscured; the brown spot at the hind wing base is small, extending to *Cu* or only little beyond that level and curving back to scarcely beyond the end of the membrana; the dark anal spot is either entirely absent or reduced to an isolated subcircular dot occupying 6 cells at a maximum. The females are variable, as described by Ris in the monograph; the specimen from Mount McKinley shows no indication of nodal or apical wing spots.

The account of this form given by Needham and Gyger is non-descript and valueless.

The measurements of the three specimens from Mindanao are: male, abd. + app. 23.5–24.5 mm., hind wing 32.0–33.0 mm.; female, 21.0 and 31.0 mm.

Material examined.—Two males, one female, east slope of Mount McKinley, 3,000 feet, Davao Province, Mindanao, collected September 22, 1946, by F. G. Werner. One pair in Chicago Natural History Museum, one male in the Leiden Museum.